

CLAIMS

What is claimed is:

1. A tool for making an undercut in a substrate, said tool comprising:

an elongated bit shaft having a cutting tip positioned at one end and a tang positioned at an opposite end, said bit shaft being rotatable about a lengthwise axis to bore an opening in said substrate with said cutting tip;

a chamber located within said bit shaft and positioned between said cutting tip and said tang, said chamber having an opening providing access thereto;

a cutting blade positioned within said chamber, said cutting blade being movable between a retracted position within said chamber and an extended position projecting outwardly from said bit shaft through said opening; and

means for moving said cutting blade between said retracted and extended positions, said cutting blade forming said undercut when in said extended position upon rotation of said bit shaft.

2. A tool according to Claim 1, wherein said blade moving means comprises:

a cam rotatably mounted within said chamber adjacent to said cutting blade, said bit shaft including a slot extending between said chamber and said opening, said cutting blade engaging said slot and being guided thereby;

a cam follower mounted on said cutting blade and engaging said cam, rotation of said cam relative to

said bit shaft moving said cutting blade through said slot between said retracted and extended positions; and
a camshaft attached to said cam and extending lengthwise through a passageway in said bit shaft toward said tang, rotation of said camshaft effecting rotation of said cam for deploying and retracting said cutting blade.

3. A tool according to Claim 2, wherein said camshaft is arranged co-axially within said bit shaft passageway.

4. A tool according to Claim 2, wherein said cam follower comprises a pair of flanges extending from an end of said cutting blade and said cam comprises a slot defining an eccentric path, said flanges engaging said slot and being forced along said path upon rotation of said cam relatively to said bit shaft.

5. A tool according to Claim 1, wherein said moving means comprises:

a bore extending longitudinally through said bit shaft, said bore being in communication with said chamber, said chamber comprising a passageway oriented angularly with respect to said bore and having at least one guide surface engageable with said blade for guiding it through said passageway; and

an actuating rod positioned within said bore and attached to said blade, said blade being movable through said passageway between said retracted and extended positions upon lengthwise motion of said actuating rod through said bore.

6. A tool according to Claim 5, wherein said blade is resiliently flexible and fixedly attached to said actuating rod, said blade bending away from said actuating rod when moving through said passageway into said extended position.

7. A tool according to Claim 6, wherein said passageway is curved.

8. A tool according to Claim 1, wherein said blade moving means comprises an axle positioned within said chamber, the chamber being defined by first and second sidewalls angularly oriented with respect to one another, said axle being substantially lengthwise aligned with and offset from the longitudinal axis of said bit shaft, said cutting blade being mounted on said axle between said sidewalls for pivoting motion into and out of said chamber, rotation of said bit shaft in a first direction causing said blade member to pivot on said axle and move into said chamber against said first sidewall upon contact between said blade and said substrate, rotation of said bit shaft in an opposite direction causing said cutting blade to pivot on said axle and move out of said chamber and into engagement with said second sidewall upon contact between said blade and said substrate.

9. A tool according to Claim 8, wherein said first and second sidewalls are oriented at 90° to one another.

10. A tool according to Claim 8, wherein said first direction corresponds with the direction of advance of said bit shaft through said substrate.

11. A tool according to Claim 8, further comprising a biasing member engaging said cutting blade and biasing it into said retracted position.

12. A tool according to Claim 1 wherein said moving means comprises:

an axle mounted within said chamber, said cutting blade being mounted on said axle for pivoting motion between said retracted and extended positions;

a biasing member connected between said bit shaft and said cutting blade for biasing said cutting blade into said retracted position; and

an inflatable balloon positioned within said chamber adjacent to said cutting blade, a passageway extending along said bit shaft for conducting a pressurized fluid to and from said balloon for inflation and deflation thereof, said cutting blade being engaged by said balloon upon inflation thereof and pivoted on said axle into said extended position, said biasing member pivoting said cutting blade into said retracted position upon deflation of said balloon.

13. A tool according to Claim 1, wherein said moving means comprises a flexible resilient beam having a first end mounted within said chamber and an opposite end, said beam being oriented substantially lengthwise along said bit shaft, said chamber having a sidewall, said cutting blade being mounted on said opposite end of said beam and adjacent to said sidewall, said beam being biased to normally position said cutting blade in said extended position, said blade being held in said extended position by contact with said substrate upon rotation of said bit shaft in a direction tending to force said cutting blade against said sidewall, said

cutting blade being resiliently deflected into said chamber by contact with said substrate upon rotation of said bit shaft in an opposite direction.

14. A tool according to Claim 13, wherein said cutting blade comprises an angularly oriented cutting edge extending from said opposite end of said beam toward said first end, said cutting edge facilitating deflection of said beam into said chamber upon engagement of said cutting edge with said substrate.

15. A tool according to Claim 13, wherein said cutting blade is angularly oriented with respect to a longitudinal axis of said bit shaft.

16. A tool according to Claim 13, wherein said cutting blade is curved.

17. A tool for making an undercut in a substrate, said tool comprising:

- an elongated bit shaft having a cutting tip positioned at one end and a tang positioned at an opposite end, said bit shaft being rotatable about a lengthwise axis to bore an opening in said substrate with said cutting tip;

- a chamber located within said bit shaft and positioned between said cutting tip and said tang, said chamber having an opening providing access thereto;

- a cutting blade positioned within said chamber, said cutting blade being movable between a retracted position within said chamber and an extended position projecting outwardly from said bit shaft through said opening; and

an actuator connected to said cutting blade and effecting movement thereof between said retracted and extended positions, said cutting blade forming said undercut when in said extended position upon rotation of said bit shaft.

18. A tool according to Claim 17, wherein said actuator comprises:

a cam rotatably mounted within said chamber adjacent to said cutting blade;

a cam follower mounted on said cutting blade and engaging said cam, rotation of said cam relative to said bit shaft moving said cutting blade between said retracted and extended positions; and

a camshaft attached to said cam and extending lengthwise through a passageway in said bit shaft toward said tang, rotation of said camshaft effecting rotation of said cam for deploying and retracting said cutting blade.